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ABSTRACT

This booklet, the third in a series of documents constituting a handbook for teachers and administrators on educational computing, identifies factors to consider when developing district or building level computer-relevant, staff development programs. It highlights the importance of staff development activities and suggests strategies for involving teachers and administrators in such activities. Characteristics, objectives, and activities of effective staff development programs are identified, and special problems in designing programs are listed. Appendices contain (1) a conceptual model for staff development and additional procedures and practices that aid effective staff development; (2) a list of staff development activities relevant to computers in curriculum and instruction, including programs, courses, and resources developed by local school districts, educational service districts, colleges and universities, and other public or private agencies; and (3) a selected 28-item bibliography on general staff development, as well as materials that address computers in curriculum and instruction, directed toward staff development. (LMM)

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Computer Technology in Curriculum and Instruction Handbook

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Design For Staff Development

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Design For Staff Development

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"Computer figure" courtesy of Leo B. Christopherson, author of ANDROID NIM

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DESIGN FOR STAFF DEVELOPMENT: COMPUTERS IN CURRICULUM AND INSTRUCTION

Prepared by

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DESIGN FOR STAFF DEVELOPMENT: COMPUTERS IN CURRICULUM AND INSTRUCTION

"Ignorance of computers will render people as functionally illiterate as ignorance of reading, writing and artithmetic."

Donald Michael in The Unprepared Society

INTRODUCTION

The purposes of this booklet of the series, COMPUTER TECHNOLOGY IN CURRICULUM AND INSTRUCTION HANDBOOK, are:

- To identify factors to consider when developing district or building level, "computer-relevant" staff development programs.
- To highlight the importance of staff development activities if computers are to become integral, accepted components of curriculum and instruction.
- To suggest strategies for involving teachers and administrators in staff development.
- To identify characteristics of effective staff development programs.
- To provide examples of staff development programs, information, resources, and references.

FOCUS AND DEFINITION

Although the catalyst for staff development may be a single teacher or administrator with interest in computer technology, the focus of this booklet is district and/or building level staff development.

In this context, staff development is defined as "organized training of a predetermined group of teachers and/or administrators for the purpose of increasing their awareness, knowledge, skill and ability to employ computers as they carry out their curricular and instructional activities/ responsibilities."

PRINCIPLES OF EFFECTIVE STAFF DEVELOPMENT

A number of studies have examined the characteristics of effective staff development programs. These principles apply regardless of program focus (i.e. computer technology, language arts, equity). The most universal principles are presented below:

1. Decision making about inservice is a shared responsibility involving those affected as well as those responsible for administering and delivering the program.

2. Programs are related to the participants' assignment and needs and are school-based rather than college-based.

3. Participants are actively involved in the inservice activity as co-helpers and/or co-learners rather than as passive recipients of content.

4. Provision is made for adequate released time during the school day, adequate support services, and essential resources.

5. The expected outcomes and objectives of the inservice are explicity known before the program and evaluated after the program.

6. Inservice activities are planned, continuing features of a comprehensive district-wide staff development program.

7. Opportunities exist for individualization within the program and permit some degree of self-direction and self-initiative.

8. Staff development programs are not isolated, one-time events; they always include provision for appropriate follow-up and/or supervised activity.

9. The individual or agency that will "deliver" the staff development is involved with others (See #1 above.) during the planning stages.

10. The district/building level administration has made known its purposes and commitment regarding the staff development program.

Appendix A contains additional procedures and practices which are important to effective staff development.

SPECIAL PROBLEMS IN DESIGNING STAFF DEVELOPMENT RE COMPUTERS

A number of special problems exist in the development and design of staff development programs/activities which focus on computers in curriculum and instruction. The most significant follow:

1. Computers are threatening to many people; they arouse fear and anxiety which could impede staff development efforts.

2. Many people lack minimal awareness/knowledge about computers and, therefore, determining the level of interest in, need for, and receptivity to staff development is difficult.

3. Staff development programs which focus on computers in curriculum and instruction will require access to appropriate hardware and software. The costs of accessing such equipment and materials must be studied and planned for.

4. Staff development programs focusing on computers in curriculum and instruction require instructors knowledgeable about the K-12 system, curriculum, instructional strategies, etc. as well as computer hardware and software. Finding an adequate supply of instructors is a serious problem.

5. Although building and district administrators may voice support for staff development activities regarding computer technology, gaining a firm commitment and adequate resources may be difficult.

6. Computer technology in curriculum and instruction could cover a myriad of topics, skills, and knowledge. Deciding the specific focus of the staff development program(s) will require time and involvement of many individuals (potential participants, building/ district administrators, the "delivery agency," etc.).

Other obstacles will exist. Some will be unique to a building or district. Attempts should be made to identify potential problem areas as part of the overall design for staff development.

A FRAMEWORK FOR STAFF DEVELOPMENT PROGRAM DESIGN

The following objectives and activities* should be considered in design of staff development programs which address the use of computers in curriculum and instruction:

Objective 1 -- Gain support and commitment from building and/or district level administrators and policy makers.

- Ensure that administrators and policy makers have sufficient computer awareness and knowledge.

*Also, see Appendix A

- Provide information/evidence to administrators and policy makers which makes clear the need for a district policy and staff development concerning computers in curriculum and instruction

- Secure a written policy statement and commitment from building and/or district level administrators and policy makers concerning computers in curriculum and instruction and the need for relevant staff development activities.

- Ensure that responsibility for the staff development program be assigned to a single person who has adequate expertise in computer technology and staff development.

Objective 2 -- Gain support and involvement from prospective participants.

- Establish a task force comprised of representatives from the groups to be "trained."

- Provide computer awareness training to the task force as necessary.

- Determine the building and/or district needs to be addressed by staff development

- Identify limitations and constraints that will impact staff development programs.

Objective 3 -- Focus the staff development program(s).

- Identify specific staff development needs given the building/district policy and purposes.

- Prioritize needs and designate target population(s).

- Specify the intended objectives and outcomes of staff development programs.

Objective 4 -- Design the staff development program(s).

- Given the specific objectives/outcomes, determine the availability of resources (e.g. trainers, hardware, software, etc.).

- Consider delivery and incentive options.
- Determine content and arrange for delivery.
- Develop a plan for formative and summative evaluation and quality control.

Objective 5 -- Deliver the staff development program.

Objective 6 -- Conduct formative and summative evaluations and prepare reports.

Objective 7 -- Subsequent to the program, consult with participants periodically to determine how and if the staff development has achieved its intended objectives/outcomes and if participants need additional training or technical assistance.

EXAMPLES OF STAFF DEVELOPMENT PROGRAMS, COURSES AND RESOURCES

Appendix B identifies a number of staff development activities relevant to computers in curriculum and instruction which have been developed and implemented for teachers and administrators.

The list includes staff development programs and courses relevant to computer technology developed by local school districts, eductional service districts, colleges/universities, and other public or private agencies.

ANNOTATED BIBLIOGRAPHY

Appendix C is a selected bibliography of staff development materials addressing computers in curriculum and instruction as well as staff development per se.

APPENDIX A

A CONCEPTUAL MODEL FOR STAFF DEVELOPMENT

This model was developed by the Organizational Structure Process and Change Task Force of the National Inservice Network in cooperation with the Regular Education Inservice Project and the National Rural Research and Personnel Preparation Project, Bloomington, Indiana: University of Indiana (MSU Project).

CONCEPTUAL MODEL & STATEMENTS OF QUALITY PRACTICE

Over the course of the development of these statements, several different methods of clustering them have been used. Initially, the statements were grouped by three main categories: planning, implementation, and evaluation. Each of these main categories had the same three subcategories: management, participants, and students.

In this final listing of the quality practice statements, a different approach to clustering has been used. But it should be noted that the rationale behind the first organizational approach is still important: the Quality Practices Task Force advocates a problem-solving approach to the design and provision of inservice activities. Such an approach begins with the identification of needs--organizational, programmatic and individual needs--and moves through planning and management to program evaluation, which then loops back into ongoing needs identification. Threaded throughout the process, and throughout the quality practices statements themselves, is a focus on students. This focus recognizes student needs, student involvement, and attention to the impact upon students of inservice activities.

As can be seen in the Conceptual Model displayed on page 12, students are the central and ultimate target of the inservice efforts. The participants are the immediate beneficiaries of the training, (e.g., teachers, parents, administrators, school board members, clinicians, aides, and others) as well as key personnel in designing the inservice efforts. The conceptual model is designed for that person(s) in the management scheme of an agency/institution given the responsibility for planning, implementing and evaluating the inservice effort. The quality practices serve as procedures or guidelines to be followed in each of the critical areas, with the ultimate goal being a well conceived and designed inservice program. They are grouped into six main categories. In several instances, the original quality practice statements have been rewritten for clarity, or related statements combined.

The first set of statements describes the importance of creating an inservice system which is institutionalized--made a part of the organization itself, whether that organization is a single school building, a district, or a regional or state agency. It should recognize the need for quality professional development programs to have an impact upon organization as well as individuals. The development of a written plan, approved by a policy-making body, which sets forth goals, specifies responsibilities, identifies resources, and addresses needs assessment, planning, program implementation and evaluation processes, is advocated in this first group of quality practice statements.

The second through fifth sets of statements describe essential characteristics of good staff development programs. The literature supports that

quality inservice is planned, delivered and evaluated in ways which are collaborative--ways which actively involve participants, students, and the community. The literature supports that programs should be based upon identified needs; that professional development programs should be responsive--to individuals, to local conditions, to systems and organizations; that activities should be accessible to participants. Quality practice statements which reflect these characteristics are listed in these sets of statements.

The sixth grouping describes practices in the area of evaluation. These practices can be used as a tool for strengthening the planning and implementation as well as assisting to determine the effectiveness of the program.

I. Quality Practice in Inservice Education recognizes that programs must be integrated into and supported by the organization within which they function.

A formally adopted written plan of inservice for the district or agency should be prepared. It should describe all components of a comprehensive system. This plan can then be used as a basis for evaluation and ongoing planning, for communication purposes and to build support for the program.

- The inservice education program is an integral part of the total organizational system within which it functions.
- Written policy exists to support the inservice education program.
- The assumptions and the theoretical rationale underlying the inservice program are explicity stated.
- The inservice education program design describes the organizational role, responsibility and support for planning, implementation and evaluation of the program.
- Procedures exist to assure the program of adequate fiscal, material, staff and facility resources .
- Federal, state, and local policies pertaining to the inservice education program are studied by planning participants.
- The inservice program design includes plans for facilitating the implementation of quality practices throughout the system.
- The inservice program design is long range and provides for ongoing implementation, support and evaluation.

- Information about inservice activities is systematically communicated to all audiences concerned.

II. Quality Practices in Inservice Education are designed to result in programs which are collaborative.

Collaborative approaches to inservice programs are the most effective. Including participants, students, and the community in program planning, delivery and evaluation can result in increased motivation, strengthened support and maximal resources.

- The inservice education program provides opportunities for all school personnel to act as participants.
- Personnel from agencies involved or affected by the inservice education program are included in the planning process.
- All groups which are affected by the inservice education program, including parents and students, have a voice in decisions regarding the program.
- Inservice activities include students as teachers/learners whenever possible.
- Procedures exist to assure inclusion of community resources for the inservice education program.
- Participants and others affected by the inservice education program are major providers of data for evaluation.

III. Quality Practices in Inservice Education are designed to result in programs which are needs based.

Inservice education is a support service for the total educational system. It draws its legitimacy from the contribution it makes to strengthening the system's programs and services for students.

- The inservice program design recognizes the vital importance of the participants' perceptions of the need for the training proposed.
- An assessment of the strengths and needs of the prospective participants and the systems is part of the inservice program design.

- Inservice program goals are derived primarily from a set of educational goals for students, including students with handicaps.

- Inservice content and strategies are drawn from and designed to meet the assessed needs of students, personnel and organizations.

- Programs include activities to meet the needs of leadership personnel, with special attention to building principals.

IV. Quality Practices in Inservice Education are designed to result in programs which are responsive to changing needs.

Responsive inservice, built upon identified needs, meets those needs and is adaptable to ongoing changes in programs, personnel and conditions. It is planned and delivered in ways that recognize the findings of research on innovation and change theories.

- The inservice program design defines a dynamic and continuous process that is flexible and responsible to changing needs and new requirements.

- Inservice activities are individualized, insofar as possible, to meet the needs and goals of individual participants.

- The inservice program design includes goals which are designed to reduce undue stress and to increase both competence and morale among program participants.

- Inservice providers are selected on the basis of qualifications for specific tasks.

- Inservice activities make use of peer-teaching strategies and participant-created materials, whenever appropriate.

- On-site demonstrations with students are included when appropriate to the inservice education experience.

- Participants are provided with positive feedback on their progress and with follow-through consultation which is kept separate from the system's personnel evaluation procedures.

V. Quality Practices in Inservice Education are designed to result in programs which are accessible.

The inservice program is readily accessible in time and location, and is planned to provide the best conditions for learning.

- Inservice activities are offered in a logical sequence.
- Inservice activities are offered frequently.
- Inservice activities are planned and conducted with minimum interference to the students' ongoing instructional program.
- Inservice activities are conducted primarily during participants' normal working hours.
- Inservice activities are conducted, whenever possible, on the participants' work site.
- Inservice locations are selected to provide the most appropriate setting for the knowledge, skills and attitudes to be acquired and demonstrated.

VI. Evaluation of inservice activities is an essential component of a quality program, and should be designed and conducted in ways compatible with the underlying philosophy and approach of the program.

Information drawn from evaluation can help determine the degree of effectiveness of the professional development experiences. Ongoing evaluation can also be used to strengthen planning and implementation activities.

The Task Force defines evaluation as the systematic collection of information about the context and operation of inservice programs which can be used to: (1) determine needs, (2) plan programs, (3) revise and redevelop activities, and (4) judge impact:

- Decisions concerning the inservice education program consider ongoing program evaluation by program participants and others affected by the program.
- The inservice program design includes both short-term and long-term goals.
- The inservice evaluation design is comprehensive and addresses the process components: planning, implementation, and dissemination.
- The inservice evaluation design is responsible to knowledge, skill, and effective outcomes.
- Data from evaluation is used for ongoing planning of the inservice program.

- The inservice education evaluation design is reliable and valid.

- The evaluation design includes plans to frequently report data on all major aspects of the program-including impact on students to all major audiences.

- The documentation of the impact of inservice activities should include the perceptions of students themselves whenever appropriate.

DEVELOPMENT OF THE MODEL AND ACTION STEPS

After initial task force development efforts, MSU staff, including personnel from the National Rural Project housed at MSU, conducted five days of intensive inservice education with fifty Kentucky Department of Education regular and special education personnel. They used the task force product as the primary stimulus vehicle for enhancing abilities of the SEA personnel to assist local education agencies in designing, implementing, and evaluating comprehensive inservice education. One major aspect of the five-day conference was to modify the inservice design model and the quality indicators in order to make them more understandable and meaningful to local education agency personnel. The quality indicators were converted to action steps enabling SEA and LEA personnel to monitor the inservice design processes as school systems develop comprehensive inservice education programs.

During the five days of staff development with SEA personnel, teams were formed to provide regional inservice education workshops to all 181 school systems in Kentucky. Each team included program managers, accreditation specialists, guidance and counseling supervisory personnel, a special educator from the Kentucky Bureau for the Education of Exceptional Children, and two staff members from the National Rural Project (NRP). The ten teams conducted regional workshops and provided follow-up assistance to LEAs in the development of comprehensive inservice programs using the Inservice Design Model and Action Steps.

The inservice design model is depicted in Figure 1. It will be noted that the time-specific phases are linear in progression and that the generic activities cut across each time specific phase.

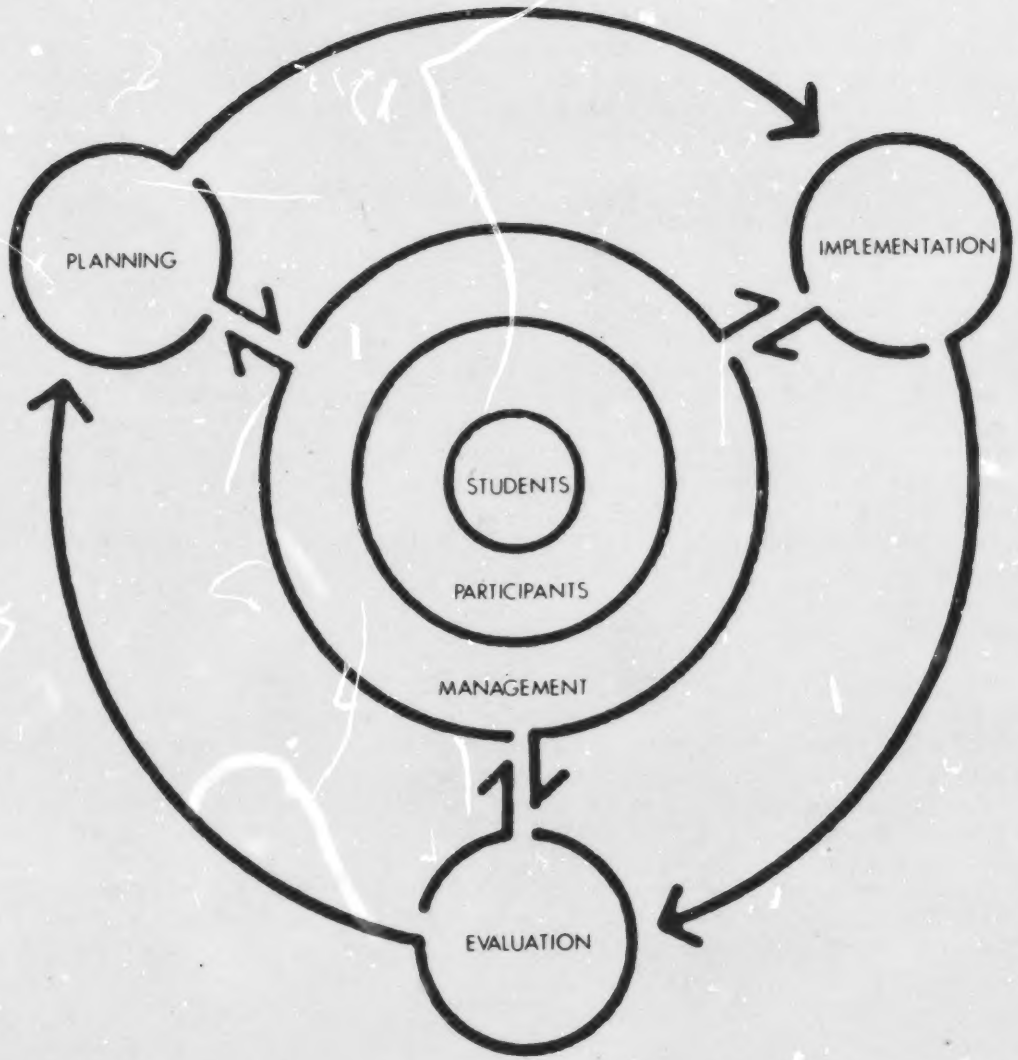
PLANNING
IMPLEMENTATION
STUDENTS
PARTICIPANTS
MANAGEMENT
EVALUATION

Figure 1

TIME-SPECIFIC PHASES

Phase 1: Preliminary Planning

During this phase, school system personnel make decisions about the general parameters of the inservice education program. Priorities are discussed and decisions are made regarding responsibilities and assignments for designing the inservice education program. Additionally, staff who are to receive inservice education are identified and available resources are considered. A preliminary needs assessment structure is determined that will provide program planning information according to the parameters determined.

Phase 2: Needs Assessment

During this phase, the inservice planning team collects and analyzes data in order to program subsequent steps in the inservice design. Currently existing needs assessment data should be considered whenever it fits the parameters of the current planning effort, and new data should be collected from all individuals and agencies that will be impacted by the inservice program. Needs assessment data can be collected by questionnaire, interview, or other procedures that will provide answers to the questions; what inservice education is needed, by whom, to what extent, when, and by what format? These data should provide inservice planners with sufficient information to begin to develop goals in Phase 3 of the inservice planning effort.

Phase 3: Goal and Objective Setting

During this phase, inservice planners refine the initial problems discussed in Phase 1, consider the data from the needs assessment, and develop short- and long-term inservice education goals for the various groups of individuals who will receive inservice education. Short-term goals should reflect high priority or crisis needs to be met. Longer-term goals will most likely be oriented to the type of systemic change being undertaken and determined during Phase I. The key to successful goal setting is focusing on goals relevant for the people participating in the inservice education programs. Unique sets of objectives should be developed for each short- and long-term goals and for each group to receive inservice education.

Phase 4: Task, Activity, and Resource Determination

For each objective, planners develop a series of activities designed to meet that objective and carefully consider resources necessary to implement the activities. Decisions should be made during this phase regarding persons responsible for carrying out the various activities. Time, space, and financial resources should be determined, and the overall map of the inservice education program should be developed reflecting these timelines and resources. Figure 2 illustrates a planning format that encompasses the elements of this model.

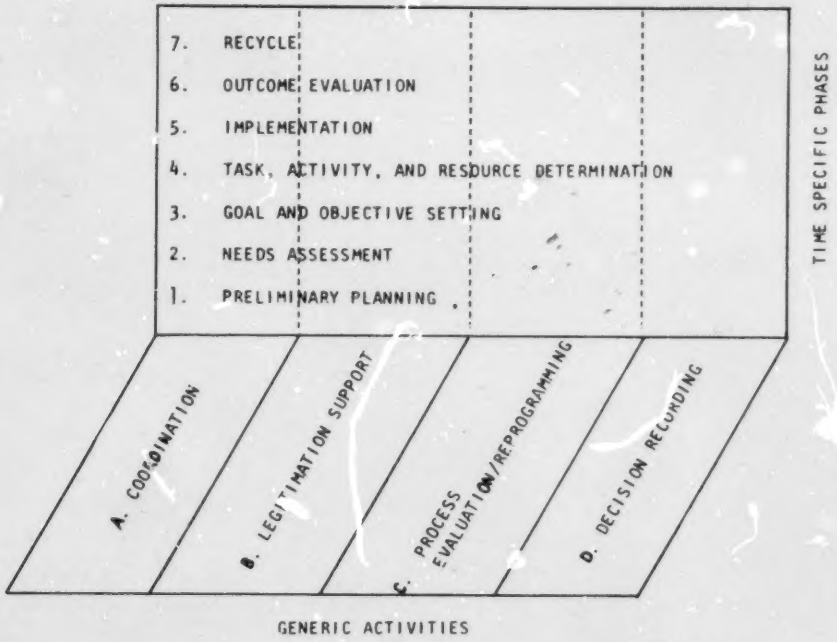

Figure 2

Phase 5: Implementation

During this phase, the actual inservice activities are conducted, process evaluation takes place, and modifications are made of subsequent inservice education sessions. This is the phase when the identified goals, objectives, and activities are accomplished.

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Phase 6: Outcome Evaluation

In this phase, which may occur whenever a timeline calls for objective completion (that is, not necessarily at the end of a school year), an assessment is made to determine the degree to which each goal and each set of objectives has been reached. Once all inservice education activities have been conducted, an overall outcome evaluation can be conducted assessing the value of individual inservice education activities and the impact of the overall inservice education program on the organizational change projected during Phase 1, Preliminary Planning.

Phase 7: Recycle

One product of the outcome evaluation in Phase 6 is a statement of goals and objectives that, even though not met, were determined to be of sufficient significance that additional efforts should be made to reach them. During the recycling phase, an analysis is made to determine which earlier phase should be the entry point for beginning to attack the unmet goal or objective. For example, if evaluation data indicate that perhaps the previous needs assessment is now inadequate, recycling would begin with Phase 2. If, on the other hand, analysis indicated that needs assessment, goal setting, and objective development were all adequate, but sufficient resources were not available to the inservice activity, then recycling would be to Phase 4 with the input of additional resources. It should be recognized, however, that once a series of activities has been conducted, it is likely that a new series will need to be established in order to meet the same goal or objective, since the recipients of the inservice education program remain the same and would probably rebel at redudancy.

GENERIC ACTIVITIES

The foregoing description of the time-specific phases of the model is relatively standard in terms of good inservice design and practice. The generic activities component of the model sets this model apart by requiring attention to five generic functions at each phase. An explication of each of these generic activities follows.

Coordination is the process whereby inservice education resources are managed in an effective, efficient, and timely manner. Coordination includes:

Initiating	Giving direction on a continuing basis to individuals and groups relating to specific responsibilities, tasks, and schedules.
Facilitating	Providing time, materials, space, and other resources on a continuing basis for specific use in task accomplishment.

Controlling	Directing the flow of events on a continuing basis as scheduled in relation to personnel, space, and resource utilization.
Communicating	On a continuing basis, informing all involved persons to assure that specific information needs are met, provide feedback, and promote operational affiliation (belonging to a larger whole).
Monitoring	Gathering information on a continuing basis about specific operating events, recording them, and comparing them with schedules and tasks.
Correcting	Providing corrective feedback on a continuing basis to responsible individuals and groups regarding discrepancies identified via monitoring.

Legitimation/Support

A procedure for constantly assessing the degree of administrative support for the inservice education program should be developed. Legitimation of an inservice effort is typically reflected through administrative assignment of resources including time, money, personnel, and space. Additionally, the involvement, where appropriate, of LEA administrators and other decision-makers in the planning, implementation, and evaluation of the inservice effort suggests the legitimation of support for the inservice program. Since, the purposes of this model, inservice education is seen as a vehicle for enhancing systemic change, legitimation occurs when the inservice education effort facilitates overall local education agency goals and change strategies.

Process Evaluation and Reprogramming

Process evaluation is the use of ongoing assessments at each phase in order to determine the positive or negative impact of phase activities on the overall inservice education program. Where concerns or deviations from expectations or plans are identified, changes may be made to better insure attainment of inservice goals and objectives. A formal process evaluation system should be developed rather than relying on the more typical informal assessment, "how's it going?" Process evaluation data indicate a need for reprogramming.

Decision Recording

Minutes should be taken of all meetings and a record kept of all decisions made and procedures used in each phase. This decision recording will facilitate inservice education planners' efforts during the course of the inservice program. It will also be useful as subsequent inservice activities are designed.

ACTION STEPS

A series of quality indicators were developed by the task force for each of seven stages in the Johnson and Riley change model. The MSU project and the ten Kentucky SEA teams modified the quality indicators to reflect action steps. These are listed below and may be easily converted into a checklist format for local use by, for example, adding columns to indicate persons responsible for each action step and a time when that step is accomplished.

Phase 1: Preliminary Planning

1.1 Determine governance structures for inservice education, such as a district inservice committee composed of administrators, support personnel, teachers, and others (e.g., a school board member, parent, student).

1.2 Adopt a local inservice education policy statement.

1.3 Agree upon a preliminary estimate of school system needs.

1.4 Establish the general purposes of the inservice education program.

1.5 Identify probable participants for the inservice education program.

1.6 Estimate basic timelines and requirements for human and fiscal resources.

1.7 Develop a preliminary needs assessment design.

Phase 2: Needs Assessment

2.1 Specify areas to be addressed by the needs assessment based on general problems and participants identified during preliminary planning.

2.2 Identify organizational characteristics, administrative policies, values, and attitudes which may encourage or hinder staff development efforts.

2.3 Secure easily accessible and relevant information (e.g., student records, CTBS test results, accreditation reports, and anecdotal comments from personnel).

2.4 Develop data collection strategies for areas not covered by existing information. Examples may include teacher surveys, administrative questionnaires, and meetings sponsored by building-based inservice subcommittees.

2.5 Establish data collection and analysis timelines.

2.6 Identify individuals to collect needs assessment data utilizing the adopted strategy or strategies.

2.7 Collect, analyze, and summarize the data.

2.8 Determine that sufficient data are available for planning purposes.

2.9 Disseminate the results to respondents and other interested parties.

Phase 3: Goals and Objectives Setting

3.1 Translate the needs assessment results into general areas of concern.

3.2 Prioritize these concern areas by:
a. short-term inservice needs (e.g., crisis problems),
b. long-term inservice needs (e.g., non-crisis problems).

3.3 Write short- and long-term inservice education goal statements to include each of the identified concern areas and to impact on all relevant personnel.

3.4 Write measurable objectives for short- and long-term goals.

3.5 Re-examine the goal and objective statements to determine if identified needs are reflected.

3.6 Evaluate the goal and objective formulation process to determine effectiveness and efficiency.

Phase 4: Task, Activity, and Resource Determination

4.1 Conduct a task analysis for each goal related objective.

4.2 Identify all possible strategies/procedures for meeting each objective.

4.3 Select inservice activities designed to meet cognitive, attitudinal, and skill objectives.

4.4 Identify in-district resources (i.eg., school personnel and local community at large).

4.5 Identify outside resources. Take into consideration:

a. skill to address specific need areas,
b. availability,
c. practicality, and
d. cost effectiveness.

4.6 Identify available administrative provisions for inservice activities (e.g., grouping patterns, instructional modules, field trips, telecommunications, etc.).

4.7 Assign activity implementation responsibilities to individuals or groups.

4.8 Identify scheduling alternatives (e.g., Saturday sessions, designated inservice days, brown bag lunches, potluck suppers, etc.).

4.9 Select the appropriate combination of resources, administrative provisions, and scheduling alternatives to effectively attain each objective.

4.10 Specify steps to accomplish each inservice activity.

4.11 Determine a timetable for implementation of each strategy/step.

4.12 Develop a total timetable (e.g., a PERT or GANTT chart) for all inservice activities and procedural steps.

4.13 Design an implementation phase monitoring system for process evaluation.

4.14 Establish tentative target data for outcome evaluation.

4.15 Develop a record keeping system.

4.16 Evaluate the task, activity, and resource selection process to determine its effectiveness and efficiency.

Phase 5: Implementation

5.1 Insure that inservice implementation is guided by a plan which specifies not only the inservice model or strategies selected for use, but also details, objectives, activities, and accountability dimensions.

5.2 Emphasize in implementation the major processes relating to coordination (including initiating, facilitating, controlling, communicating, monitoring, and correcting), legitimation, process evaluation/reprogramming, and decision recording.

5.3 Implement activities according to specified timelines.

5.4 Monitor activities to determine whether:

1. Resources are utilized as planned.
2. Activities are carried out as planned.
3. Timelines are adhered to.
4. Objectives are being met.
5. Evaluations are carried out as planned.

5.5 Document all changes in inservice activities/strategies.

Phase 6: Outcome Evaluation

6.1 Determine the degree to which each goal specified in Phase 3 has been attained.

6.2 Conduct an analysis of goals and objectives not completely attained including:

1. Analyzing objectives which cannot be completed at all.
2. Analyzing objectives which can be completed but with some difficulty.
3. Analyzing objectives which can be completed with a reasonable time extension.
4. Determining which unattained goals, if any, should be dropped and which should be recycled.

6.3 Determine if goals resulted in any unintended outcomes.

6.4 Document evaluation findings.

Phase 7: Recycle

7.1 Recycle to meet existing goals/objectives.

1. For goals recommended for continuation, use recycling during the evaluation phase and determine which time-specific phase would be most appropriate as a recycling point.

2. Recycle to that time-specific phase to reinstitute the process described for that phase or as modified by process evaluation and reprogramming.

7.2 Develop new or revised goals/objectives as necessary by:

1. Reviewing goals and related objectives in the "can't be completed" category and determining if those goals should be restated.

2. Restating goals as appropriate and writing new objectives for each restated goal.

3. Developing new goals where new needs have been identified either through outcome or process evaluation.

For copies of this brochure or the complete final report, please write:

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APPENDIX B

STAFF DEVELOPMENT PROGRAMS, COURSES, AND RESOURCES

STAFF DEVELOPMENT PROGRAMS, COURSES, AND RESOURCES

College and University Offerings

Program: Summer Workshop: Using Computers in School and Home
Contact: Robert L. Steiner
School of Education - University of Puget Sound - Tacoma, Washington 98416
Brief Description: Examination of how microcomputers can be effectively utilized in schools. BASIC & LOGO programming skills will be emphasized. Some commercially developed programs will be examined.

Program: Computer Primer (Workshop)
Contact: Pat McIntyre
St. Martin's College, Lacey, Washington 98503
Brief Description: An introductory workshop dealing with the evaluation of software rather than using programming as the central focus.

Program: PILOT Programming
Contact: Scott Rhodes
Saint Martin's College, Lacey, Washington 98503
Brief Description: An introduction to the PILOT programming language for teachers (an alternative from BASIC programming with an emphasis on CAI).

Program: Comparing Microcomputer Systems
Contact: Pat McIntyre
St. Martin's College, Lacey, Washington 98503
Brief Description: A workshop using a simulation to model the process of selecting hardware in an educational setting.

Program: Computer Science
Contact: George Gerhold
College of Arts & Sciences, Western Washington University, Bellingham, Washington 98225
Brief Description: This is a three week summer workshop with emphasis on CAI and LOGO. Teachers get a lot of hands-on experience in programming. They also are exposed to and discuss a variety of hardware and software packages.

Program: Introduction to Basic Programming for Teachers
Contact: Don Miller, Special Education Director, ESD 114
P.O. Box 155, Port Townsend, WA 98368

Brief Description: Two credit course through SPU taught in Port Townsend for teachers located in Clallam and Jefferson Counties.

Program: Computers in the Classroom
Contact: Les Blackwell, Education Department
Western Washington University, Bellingham, Washington 98225
Brief Description: This course is a study of computers in the classroom including Computer-Managed Instruction Systems (CMI) and Computer-Assisted Instructional Systems (CAI).

Program: Structured Techniques for Designing CBE Coursework
Contact: Joan Hayes
Western Washington University, Bellingham, Washington 98225
Brief Description: One day workshop on analyzing content for teaching concepts, designing instruction and operating techniques to match objectives.

Program: Computer Literacy for Teachers: K-12
Contact: Seattle Pacific University, Seattle, Washington 98119
Brief Description: Uses hands-on computer learning experiences to demonstrate educational programs and programming; provides elementary and secondary teachers with introductory information about the history of computers, uses of microcomputers in education and society, types of machines and programs, and computers of the future.

Program: Computers in Education
Contact: Seattle Pacific University, Seattle, Washington 98119
Brief Description: Seminar covers the educational uses of the computer, focusing primarily on the integration of the computer directly with the classroom at all levels and in all subject areas.

Program: Computer Education: Secondary Schools
Contact: Seattle Pacific University, Seattle, Washington 98119
Brief Description: Provides teachers with an adequate level of computer literacy for use in their own teaching; gives opportunities for hands-on lab work with micro and mini-computers; allows teachers to design and use a project in their own curriculum area; discusses applications of computers in math and in other fields.

Program: Evaluating Computer Based Curriculum
Contact: Seattle Pacific University, Seattle, Washington 98119

Brief Description: (Prerequisite: Computer Literacy or experience.) Acquaints educators with the variety and quality of available computer courseware; provides them with skills and knowledge necessary to evaluate computer based curriculum; teaches curriculum selection, program modification and computer operation using different types of computers.

Program: Introduction to Computers for Teachers
Contact: Eastern Washington University, Cheney, Washington 99004
Brief Description: For beginners and near beginners. What is a microcomputer, how does it work, and why you do what you do to use it. Goes beyond mere keyboard entry and discusses the classroom use for computers, programming and software development in the BASIC language.

Program: Computer, Individual and Society
Contact: Eastern Washington University, Cheney, Washington 99004
Brief Description: Impact of computers on individuals, organizations and society. Future directions for computing. Literacy particulars of interest to teachers.

Program: Computer Based Education
Contact: Eastern Washington University, Cheney, Washington 99004
Brief Description: The development and use of CAI. Writing CAI lessons in PILOT. Classroom management through the use of microcomputers. The selection of courseware for use on microcomputers.

Program: Mini-computers in the Classroom
Contact: Marvin Kleene
Washington State University, Pullman, Washington 99164
Brief Description: Classroom applications of mini-computers. Technology, programs, procedures, and operations. Practical applications.

Program: Introduction to CAI
Contact: Terry L. Anderson
Walla Walla College, College Place, Washington 99324
Brief Description: Workshop introducing teachers to use of microcomputers in instruction and to programming in BASIC.

Local School District Programs

Program: Microcomputers - Instructional Applications
Contact: Mark Long - Bethel High School
22215 38th Ave. E., Spanaway, Washington 98387
Brief Description: Basic concepts, introduction to equipment and BASIC, Atari and BASIC, Radio Shack and BASIC, Apple and BASIC, CAI, simulation, administration/classroom management, computer literacy equipment, software, personnel, vendors, delivery systems and equipment configurations, programming.

Program: Computer in the Classroom
Contact: Phyllis Tellari, Peninsula School District
107 Pt. Fosdick Cir., N.W.., Gig Harbor, Washington 98335
Brief Description: Inservice regarding computer literacy and use in curriculum and instruction.

Program: Computer Awareness Inservice
Contact: Art Maser
Highline School District, Seattle, Washington 98166
Brief Description: A comprehensive program and syllabus addressing computer based education have been designed and are presented for faculty and administrators.

Program: Computer Literacy
Contact: L. Rochon, Administrative Assistant
Aberdeen School District, Aberdeen, Washington 98520
Brief Description: Introduction to the use of computers in grades 2-12 including Gifted and Special Education. Used for computer assisted instruction and as a management tool (i.e., inventory control, record keeping attendance, word processing).

Program: Computer Education
Contact: David Kroft, Director, Staff Development
Seattle School District, Seattle, Washington 98109
Brief Description: Courses were all designed to explore the uses of microcomputers in the enhancement of school curriculum. Hands-on experience is a feature of every course offered.

Program: Computer Literacy
Contact: Rich Rose
Selah Junior High School, Selah, Washington 98942
Brief Description: First inservice course - potential use of micro computers in the classroom.

Program: Computer, 5 (1/2 day) inservice days
Contact: Lloyd Keene and Marvin Miner
Toppenish School District, 106 Franklin Avenue,
Toppenish, Washington 98948
Brief Description: Building specialists were identified; five, two-hour sessions of basic instruction. The instruction will allow them to identify students and provide an alternative learning modality.

Program: Parent-Child
Contact: Lloyd Keene
Rt. 3, Box 3953, Toppenish, Washington 98948

Brief Description: Nine sesson evening course on the use of computers. Parents and their children attended together.

Program: Computer Literacy
Contact: Tony Jongejan
Everett School District, Everett, Washington 98203
Brief Description: An intoductory workshop dealing with making decisions about computers in curriculum and instruction.

Program: Computer Literacy
Contact: Linda Malone
The Bush School
405 36th Ave. E.
Seattle 98112
(206) 322-7978
Brief Description: A working providing a setting in which teachers can actively explore computer literacy concepts with extensive hands-on experience with microcomputers. Most workshop materials and computer activities are designed for immediate use in the classroom. Focused on grades K-8.

Program: Computer Literacy
Contact: Fred Achberger
7066 NW Lois Lane
Bremerton, WA 98310
(206) 692-5934
Brief Description: Introductions to computers for educators. Program can be tailored to user need. Could include program design and software/hardware evlauation

Program: Early Entry
Contact: Lloyd Keene and Ron Livingston
Rt. 3, Box 3953, Toppenish, Washington 98948

Brief Description: Six vocational teachers and three special education teachers were trained to use computers. The objective was to enable staff to identify specific learning needs and provide an alternative learning methods (computer) usually in reading and math.

Program: Computer Literacy and District Planning
Contact: Ralph Carlson
c/o Poulsbo Elementary School
139 Noll Road, Poulsbo, Washington 98370
Brief Description: Combines both Computer Literacy and a previously developed approach to implementing a district wide computer program.

Program: Computer Awareness Training
Contact: Jim P. Gibson, Ferndale School District #502
P. O. Box 698, Ferndale, WA 98248
Brief Description: A 'trainer of trainers' approach has been developed in the Ferndale School District to provide teachers with a minimum understanding of potential computer applications. A trained teacher at each school serves as an in-school resource person and facilitator.

Program: 3 year CAI Inservice Program
Contact: John Ottosen, Supervisor of Learning Resources
Vancouver Public Schools, Vancouver, Washington 98661
Brief Description: A sequential program designed to prepare teachers and administrators for implementing microcomputers into the instructional process.

Program: Social Studies Instructional Units, K-12
Contact: Jim Sork, Supervisor of Social Studies
Vancouver Public Schools, Vancouver, Washington 98661
Brief Description: Selected teachers receive one day of in-depth training for matching software programs with instructional objectives, followed by one week of classroom implementation at a later date.

Program: Teacher Inservice
Contact: Tom Eastman, Curtis High School
University Place School District, Tacoma, Washington 98466
Brief Description: History of computers with emphasis on microcomputers, impact on teachers, computer terminology, hands-on experience in writing simple programs, end of course project to outline and/or write a simple program that could be used in the teachers' subject or grade level.

Program: Teacher Workshop
Contact: Julian W. Pietras
Bellingham High School, Bellingham, Washington 98227
Brief Description: Provides professionals the concepts, utility, and programming features of computers in either the BASIC or PILOT languages, involving the preparation of some CAI material for classroom use and evaluation.

Program: District-wide Inservice Program
Contact: George Sanders
Auburn School District, Auburn, Washington 98002
Brief Description: A comprehensive literacy program for teachers and administrators

Educational Service District Programs

Program: ESD 189 Computer Workshop
Contact: Margaret Jackson, Mary Adams
Mount Vernon, Washington 98273
Brief Description: An all day session with presentations and hands-on experiences.

Program: CAI Planning
Contact: Margret Jackson, ESD #189
Mt. Vernon, Washington 98273
Brief Description: ESD 189 is in the process of developing guidelines for districts to use in developing their own district plans. This is being done under the direction of Dr. George Gerhold, WWU and a task force from the ESD and LEAs.

Program: Computer Hardware/Software Evaluation Seminar
Contact: Media Director
ESD #121 - 1410 S. 200th -- Seattle, Washington 98148

Brief Description: All day seminar dealing with hardware and software evaluation.

Program: Apple Pilot Workshop
Contact: Cindy Bush (ESD 105)
Yakima School District, Yakima, Washington 98902
Brief Description: Apple PILOT is a user language for teachers. Participants learn how to use text/editor character generator, sound effects, and graphics editor to write student lessons.

Program: Computer Training for Teachers of the Gifted
Contact: Don Miller, Special Education Director, ESD 114
P.O. Box 155, Port Townsend, WA 98368
Brief Description: Three-day hands-on workshop to train teachers in seven small districts.

Other Public and Private Agencies

Pacific Science Center
Seattle Center
Seattle, Washington 98109

Northwest Regional Education Laboratory
Technology Center
300 S.W. Sixth Avenue
Portland, Oregon 97204

St. Martin's College
Microcomputer Resource Center
St. Martin's College
Lacey, WA 98503

PNACE (Pacific Northwest Associates of Computer Education)
c/o Tony Jongejan
Everett High School
2416 Colby Avenue
Everett, WA 98201
Phone: 206-342-7475, Ext. 36

Secteur Corporation
Professional Bldg. #103
Bainbridge Island, WA 98110
Phone: 206-842-5612

Radio Shack Computer Center(s)
515-116 NE, Suite 265
Bellevue, WA 98004
(Note: There are several Computer Centers in Washington State; among them are ones in Tacoma, Yakima, Spokane)

Bertamax, Inc.
101 Nickerson St. #202
Seattle, Washington 98109

Micro-Computer Educational Consultants, Inc.
10101 Cedrona SW
Tacoma, WA 98498

Computer Curriculum Corporation
14016 116 Place N.E.
Bellevue, WA 98033

Computerland
14340 NE 20th
Bellevue, WA 98007
(Computerland stores are also located in Seattle and Tacoma.)

Control Data Corporation
10655 NE 4th
Bellevue, WA 98004

Courseware Clearinghouse
310 First Avenue S.
Seattle, WA 98104

Science Research Association (SRA)
Secondary Courseware
6908 33rd S.E.
Lacey, WA 98503

and

Elementary Courseware
1024 S.W. 146th
Unit F
Seattle, WA 98166

If your institution, school district, ESD or agency has implemented staff development programs for school personnel relevant to computer use in curriculum and instruction and would like to be listed in this booklet, please complete and mail the form below:

- -

Program Title: _____

Contact:

Name _____

Address _____

_____

Brief Description of Program:

_____

_____

_____

Mail to:

Computer Technology in Curriculum
and Instruction Task Force
Superintendent of Public Instruction
7510 Armstrong Street SW
Tumwater, WA 98504

APPENDIX C

ANNOTATED BIBLIOGRAPHY

National Council of States on Inservice Education (NCSIE). Sources and Resources: An Annotated Bibliography on Inservice Education (Revised Edition), Syracuse, N.Y.: National Dissemination Center, Syracuse University School of Education, 1979.

A comprehensive annotated bibliography of books, articles, and monographs addressing myriad issues and topics relevant to staff development.

Orlich, Don C. A Review of In-service Education. Pullman, WA: Washington State University, 1982.

This review examines six major topics: (1) definitions, (2) research, (3) criteria for program design, (4) financing, (5) the role of the building administrator, and (6) theoretical considerations.

Rubin, Louis. Perspectives on Preservice and Inservice Education. Syracuse, N.Y.: NCSIE and the National Dissemination Center, Syracuse University, 1978.

This monograph discusses the continuum which should exist between preservice and inservice; the need for continuing staff development; and factors associated with inservice programming, incentives, and delivery.

Eldfeldt, Roy A. Criteria for Local Inservice Education Programs. Bellingham, WA: Western Washington State College Press, 1976.

A monograph which presents and discusses 29 criteria important to the design of local inservice programs.

Burrello, Leonard C. and Tim Orbaugh. "Reducing the Discrepancy between the Known and the Unknown in Inservice Education." Phi Delta Kappan, Vol. 63, No. 6, February 1982, pp. 385-388.

This article presents major findings which appear to characterize effective staff development programs, some persistent problems in inservice, examples of effective practices, and future issues related to staff development.

Joyce, Bruce and others. ISTE Reports. Syracuse, N.Y.: The National Dissemination Center, Syracuse University, 1976.

The five Inservice Teacher Education (ISTE) Concept Studies present a number of concepts, considerations, and issues associated with inservice education -- past, present, and future.

Hite, Herb and Walker, Randy. The Western Inservice Education Model. Bellingham, WA: Teacher Corps, Western Washington University, May 1982. A brief report describing the approach used by WWU Teacher Corps and Arlington School District to develop and implement a teacher-designed inservice program.

COMPUTER-RELEVANT STAFF DEVELOPMENT

The following references may be accessed from the ERIC system; the ERIC accession number is indicated:

ED 193022 Computer Literacy Program Briefs. Human Resources Research Organization, Alexandria, VA: 1978.

Computer Literacy Program Briefs for seven schools and/or school districts are presented. Topics covered in each brief include: the institution or institutions covered, the educational program strategies, the target student audience, major components of the instructional program, illustrative examples of specific objectives, organization of the instructional package, facilities and equipment used, the nature and extent of teacher training, classroom activities and resource materials, and the impact and effect of the computer literacy program.

ED 191734 Trying Out Some Ideas. Final Report Oregon System in Mathematics Education. Oregon State Educational Coordinating Commission, Portland. March 1979.

This is the final report of the Oregon System in Mathematics Education (OSME), a project to improve mathematics education learning in Oregon. OSME in-service projects for teachers provided "hands-on" workshops for teachers at both the elementary and secondary level, and helped Oregon schools and colleges establish 24 local mathematics resource centers. The OSME program tried, in a flexible, decentralized way, to strengthen the abilities of existing institutions and instructors to meet the needs and solve the problems of mathematics education. Sections included in the report are: (1) a history and outline of the project; (2) an acronym guide; (3) sample workshop activities and teacher views; (4) projects for nurturing leadership and supplementing higher education; (5) a report on Students and Computers; (6) OSME communications activities; (7) a report on evaluation of the program; (8) listings of OSME members, staff, projects, and their leaders; and (9) a selective bibliography of documents pertaining to OSME.

ED 183196 Jaycox, Kathleen M. Computer Applications in the Teaching of English. The Illinois Series on Education Application of Computers, No. 19e. Illinois University, Urbana. Dept. of Secondary Education, 1979.

This paper is written to familiarize present and future English teachers with the current status of computer assisted instruction (CAI) in the teaching of English. Addressed both to practicing teachers who have little understanding of computers, and English education majors with computer science minors, it deals with programs written in BASIC. The first section is concerned with current attitudes about computers among English teachers, the need for computer literacy, and humanistic concerns regarding computers. The following section focuses on methodology in the teaching of English apart from any form of CAI. The final five sections deal with various aspects of instructional applications of computers which could augment the methods already described. Following each section is a list of suggested projects and activities which vary according to the learner's experience in teaching and/or programming.

ED 183181 Dennis, J. Richard. Teacher Education in Use of Computers. The Illinois Series of Educational Application of Computers, No. 1e. Illinois Univ., Urbana. Dept. of Secondary Education, 1979.

Two model programs have been developed for preservice and inservice training of teachers in the instructional applications of computers. The preservice model features a background in computer science, foundations of instructional computing using a total school view and content specific view, a task-centered practicum in instructional computing, and practice teaching. The inservice training model consists of three stages: (1) initial literacy, (2) implementation, and (3) maintenance or growth. Curriculum maps are provided for both programs and the references are listed.

ED 171693 Authoring Individualized Learning Modules: A Teacher Training Manual. Description of Teacher Inservice Education Materials. National Education Association, Washington, D.C. Project on Utilization of Inservice Education R & D Outcomes, 1976.

The teacher inservice training manual described here focuses on teacher training in sequential development of individualized learning modules for computer-assisted instruction. The intent of the manual is to help the teacher recognize, design, develop, and assess individualized learning materials. This descriptive report provides information on the purposes and content of the manual as well as activities and resources involved. A critique, history of development, and ordering information are also included.

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ED 167560 REACT II: Computer-Oriented Curriculum. Description of Teacher Inservice Education Materials. National Education Association, Washington, D.C. Project on Utilization of Inservice Education R & D Outcomes, 1978.

The inservice program described here is designed for teachers who wish to investigate how computers may be applied in various subject areas, including business education, English, mathematics, science, and social studies. Nine booklets are the basic learning tools for REACT II (Relevant Educational Applications of Computer Technology). This program description provides information on the purposes and content of the materials as well as activities and resources involved. A critique, history of development, and ordering information are also included.

EJ 247947 Vannatta, Glen D. "Computers for Instructional Purposes -- A Case Study." Viewpoints in Teaching and Learning. v,57 n2 p37-45 Spr 1981.

The evolution of computers for instructional purposes in the Indianapolis Public Schools system is traced through a look at the progress of the system from the transporting of students to a college computer facility for instruction to the current explosion of microcomputers. Major problems involved teacher training, acquisition of equipment, and adaptation of learning materials to the computer.

EJ 247520 Lopez, Antonio M., Jr. "Computer Literacy for Teachers: High School and University Cooperation." Educational Technology, v21 n6 p15-18 Jun 1981.

Describes a cooperative program in which high school teachers in Louisiana participated in a series of lectures and labs geared toward helping them use microcomputers in the classroom. Topics included hardware, computer-assisted instruction (CAI), programming, and program modification.

EJ 252831 Kirchner, Alice M. "One State's Approach to Computer Literacy." Technological Horizons in Education. v8 n4 p43-44 May 1981.

Reports on a pilot project to introduce an introductory course in computer literacy for elementary through postsecondary students in Pennsylvania. Includes descriptions of course rationale and teacher training.

ED 195288 Hall, Keith A. Computer-Based Education. The Best of ERIC, June 1976-August 1980. ERIC Clearinghouse on Information Resources, Syracuse, N.Y. Nov 1980.

This bibliography contains annotations of reports, reviews, conference proceedings, other documents, and journal articles on computer based education (CBE), most of which were derived from a search of the Educational Resources Information Center (ERIC) system. Covering June 1976 through August 1980, this compilation serves as an update to two earlier papers -- "The Best of ERIC: Recent Trends in Computer Assisted instruction" (1973) and "Computer Assisted Instruction: The Best of ERIC 1973-May 1976." A brief introduction discusses instructional methods included in computer based education and explains the subject headings used in the bibliography: (1) historical references; (2) new technolgy, such as artificial intelligence and videodiscs; (3) new audiences, such as off-campus, handicapped, or incarcerated learners; (4) various content area applications including fields such as English, health sciences, languages, and social studies; (5) developmental efforts such as PLATO, TICCIT, and others concerned with teacher training; (6) basic research in computer assisted instruction; and (7) conference proceedings on computers in education. An author index is included as well as information for ordering ERIC documents.

EJ 245087 Roberts, Harold "Pepper." "Linking Computer to Curriculum Starts with the Teacher." Educational Computer Magazine, v1 n1 p27-28 May-Jun 1981.

Clover Park School District has planned a two-year phased-in implementation of microcomputers. This article describes the success and problems encountered in the first year of the program, which focused on teacher training. Journal availability: Educational Computer, P.O. Box 535, Cupertino, CA 95015.

EJ 244809 Podemski, Richard S. "Computer Technology and Teacher Education." Journal of Teacher Education, v32 n1 p29-33 Jan-Feb 1981.

Helping teachers understand the relationship between the message of instructional content and the medium of instructional technology is a legitimate focus for colleges of education. Colleges of education can respond to the need for computer sophistication by creating survey courses on the uses of computers in education.

EJ 244329 Rushby, N.J. "Computer-Based Learning in the UK: The Direction of the Art." Education Today, v30 n3 p8-13 Fall-Win 1980.

Examines computer-based learning (CBL) in the United Kingdom and suggests that CBL offers new educational approaches which teachers can use in combination with more familiar media. Also discussed are the problems of training large numbers of teachers in the use of the new computer techniques. Seven references are listed.

Some additional articles addressing computer-relevant staff development are cited below:

Phi Delta Kappa. "Microcomputers in Education." Practical Applications of Research. Bloomington, IN, Vol. 4, No. 4, June 1981.

Miller, Stuart D. "Teaching Teachers About Computers: A Necessity for Education." Phi Delta Kappan, Vol. 61, No. 8, April, 1980, pp. 544-546.

Judd, Dorothy H. "The Challenge of Professional Development: Potential Microcomputer Utilization." Educational Computer Magazine, May-June, 1981, pp. 6-8.

Dickerson, Laurel and William H. Pritchard, Jr. "Microcomputers and Education: Planning for the Coming Revolution in the Classroom." Educational Technology, January 1981, pp. 7-12.

Podemski, Richard S. "Computer Technology and Teacher Education." Journal of Teacher Education, Vol. 32, No. 1, Jan-Feb, 1981, pp. 29-33.

Anderson, Cheryl. "Teaching Computer Literacy, Guidelines for a Six-week Course for Teachers." Electronic Learning, Nov-Dec. 1981, pp. 30-31.

Diem, Richard A. "Developing Computer Education Skills: An Inservice Training Program." Educational Technology, Feb. 1981, pp. 30-32.

Edelfeldt, Roy. "Promoting Computer Awareness in Detroit, Michigan." Detroit, Michigan: Detroit Center for Professional Growth and Development, Wayne State University, 1982.

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